Remarks/Arguments

The status of the application is as follows: claims 1-20 and 22-31 are pending; claims 19, 20 and 22-31 are allowed; claims 1, 2, 6-14, 16 and 18 stand rejected, and claims 3-5, 15 and 17 are objected to for depending on a rejected base claim.

Applicant thanks the Examiner for the Advisory Action mailed August 14, 2007 and the courtesies extended during the telephone interview of Wednesday, September 5, 2007 regarding claims 1 and 18. During the telephone interview, the Examiner recommended that applicant submit a second after final amendment, re-iterating the arguments discussed over the telephone, for reconsideration. The Examiner is thanked for indicating that he would issue a second Advisory Action in response to the second after final amendment.

Claim 1

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. (US 7,085,343 B2) in view of Mori et al. (US 5,311,428). This rejection should be withdrawn because the combination of the references does not establish a *prima facie* case of obvious.

> To establish a *prima facie* case of obviousness ... the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination ... must ... be found in the prior art .... *In re Vaeck*, 947 F.2d 488, (Fed. Cir. 1991). MPEP §2142.

> To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999). MPEP §2141.02 IV.

In addition, the references teach away from at least one of the claimed aspects.

> A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). MPEP §2141.02.

Claim 1 recites, *inter alia*, first and second radiation sources ... respectively arranged to emit first and second radiation into an examination region ... first and second ***asymmetrically adjustable collimators*** that are ***asymmetrically adjustable ... to position first outer x-ray projections of respective radiation relative to second outer x-ray projections of the respective radiation***. Hence, for each radiation beam, the collimator is adjustable to move one of the outer x-ray projections with respect to the other one of the outer x-ray projections. The Office asserts that Shinno et al. teaches the above claimed aspects. However, Shinno et al. does not teach or suggest such claimed aspects.

More particularly, Shinno et al. is directed towards a multi-tube/detector computed tomography system. The tube and the detector of each pair are mounted opposite each other on a rotating gantry that rotates about a center of rotation axis. (See column 14, lines 4-16 and column 18, lines 25-37). In addition, the tube and the detector of each pair are positioned with respect to each other so that a line from the focal point of a tube to the center of the corresponding detector traverses the center of rotation axis. (See column 14, lines 17-30 and column 18, lines 25-37). The above can be seen in Fig. 19 of Shinno et al. (reproduced below) where tubes 3111 and 3121 are positioned with respect to corresponding detectors 3113 and 3123 so that imaginary "connecting lines" from the focal points of the tubes 3111 and 3121 to the "centers of the detectors" 3113 and 3123 cross through the center of rotation axis (RA). As such, the radiation "beams" are symmetric about the RA and the "center of the detectors."

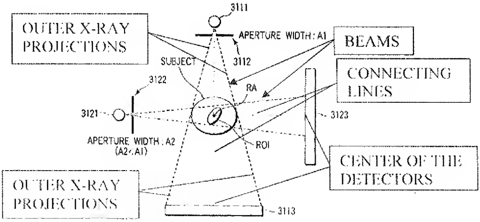

FIG. 19

Shinno et al. further discloses that an x-ray collimator is mounted at a position immediately in front of each tube and that each collimator limits that fan angle, or beam width, of the x-ray emitted from a respective tube. (See column 18, lines 38-45 and lines 50-54). The collimators are illustrated in Fig. 19 above in connection with reference numerals 3112 and 3122. As shown in Fig. 19 above, the collimators 3112 and 3122 collimate the emitted radiation to position the "outer x-ray projections," which bound the beams and determine the beam widths or fan angles, with respect to the RA and the detectors.

Each of the collimators has a plurality of moveable shield plates and driving units that separately move the plates. (See column 18, lines 45-47 and lines 54-57). The aperture width and center position of the collimators and, hence, the outer x-ray projections, the beam width, and the beam center position are adjusted via moving the plates. (See column 18, lines 47-49 and lines 57-59). As shown in Fig. 19 above, with respect to the aperture width A1, the shield plates have been moved to position both of the outer x-ray projections in accordance with the field of view (FOV). (See column 19, lines 25-28). With respect to the aperture width A2, the shield plates have been moved to position both of the outer x-ray projections in accordance with a region of interest (ROI) located within the FOV. (See column 20, lines 56-58). In Fig. 19, the center of the ROI is located on the RA. (See column 20, lines 58-61).

Figures 22 and 23 of Shinno et al. illustrate a rotating tube 3121 / detector 3123 pair at two different rotational angles. As noted above, the corresponding aperture width A2 has been set by moving the shield plates of the collimator 3122 to position both of the outer x-ray projections in accordance with the ROI. In Figure 22, the center of the ROI lies on the RA, and when this occurs the center of the ROI lies on the imaginary line connecting the focal spot to the center of the detector through the RA. As a result, the outer x-ray projections conform to the perimeter of the ROI as the rotating gantry and, hence, the tube 3121, the collimator 3122, and the detector 3123 rotate. As such, the entire ROI is irradiated as the gantry rotates.

In Figure 23 (reproduced below), the center of the ROI is offset from the RA. At a first rotational position, the center of the ROI lies on the imaginary line connecting the focal spot to the center of the detector through the RA, and the outer x-ray projections conform to the perimeter of the ROI. As such, the entire ROI is irradiated at the first rotational angle. However, at the second rotational angle, the center of the ROI is offset from the imaginary line connecting the focal spot to the center of the detector through the RA. As such, the outer x-ray projections do not conform to the perimeter of the ROI, and the entire ROI is not irradiated. (See column 20, lines 63-65).

Shinno et al. discloses that the shield plates could be moved to re-position both of the outer x-ray projections so that they are further away from each other to widen the beam so that the beam irradiates the entire ROI regardless of the rotation angle. (See column 20, line 65 to column 21, line 1). However, Shinno et al. notes that this would result in inefficient use of the x-rays since this would also result in irradiating regions of FOV outside of the ROI. (See column 21, lines 1-2). So instead and as shown, Shinno et al. moves the shield plates to move both of the outer x-ray projections in the same direction to re-position the beam center so that the out x-ray projections once again conform to the perimeter of the ROI. Shinno et al. discloses that both of the outer x-ray projections are moved as such in synchronism with the rotation angle as the rotating gantry rotates to keep to the ROI within the outer x-ray projections as the gantry rotates. (See column 21, lines 3-10).

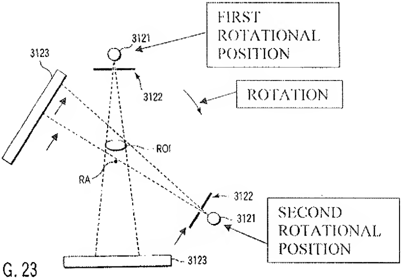

FIG. 23

From the above, Shinno et al. expressly teaches moving the shield plates of the collimators to move both of the outer x-ray projections of the x-ray beams in opposite directions to change beam widths and to move both of the outer x-ray projection of the x-ray beams in the same direction to change the beam center positions. However, Shinno et al. is silent regarding moving the shield plates of a collimator to move one of the outer x-ray projections of a radiation beam with respect to the other outer x-ray projection of the radiation beam, and claim 1 requires asymmetrically adjustable collimators that are asymmetrically adjustable … <u>to position</u> <u>first</u> outer x-ray projections of respective radiation <u>relative to second</u> outer x-ray projections of the respective radiation.

With respect to inherency, which the Office Action does not assert, the Office has not provided any evidence that makes clear that the missing descriptive matter is necessarily present in Shinno et al. or that it would be so recognized by persons of ordinary skill. As provided above, inherency may not be established by probabilities or possibilities, and the mere fact that a certain thing may result from a given set of circumstances is not sufficient. If the Office believes that the missing claimed aspect is inherent, then the Office must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic <u>necessarily</u>

flows from the teachings of the applied prior art in a non-final Office Action. *Ex parte Levy,* 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). MPEP §2141.02 IV

Moreover, Shinno et al. teaches away from asymmetrically adjusting either of the collimators 3112 and 3122 to move one of the outer x-ray projections of a respective radiation beam with respect to the other outer x-ray projection of the radiation beam. As discussed above in connection with Figures 18, 22 and 23, Shinno et al. discloses moving the shield plates only to re-position both of the outer x-ray projections to set the beam width and the beam center.

As discussed *supra* in connection with Figure 23, Shinno et al. notes that re-positioning both of the outer x-ray projections to define a beam width that irradiates a region of the FOV outside of the ROI to irradiate the entire ROI for all rotational angles results in inefficient use of the radiation. This is discussed above in connection with the case where the ROI is offset from the RA. As a consequence, Shinno et al. teaches that both of the outer x-ray projections of a beam should be set in accordance with the ROI to conform to the perimeter of the ROI, and, if needed, both of the outer x-ray projections of the beam should be moved to move the center of the beam so that the beam continues to conform to the perimeter of and irradiate the entire ROI.

It is to be appreciated that moving only one of the outer x-ray projections of a respective radiation beam with respect to the other outer x-ray projection of the radiation beam would lead to the above undesired scenario in which the outer x-ray projections of the beam would not be set in accordance with or conform to the perimeter of the ROI for all rotational angles. Thus, Shinno et al. teaches away from moving only one of the outer x-ray projections.

In view of the above, it is readily apparent that Shinno et al. does not teach the subject claimed aspect. Since the Office asserts that Shinno et al. teaches this aspect, the Office has failed to establish a *prima facie* case of obvious based on Shinno et al. in view of Mori et al. Therefore, this rejection should be withdrawn.

Claim 18

Claim 18, which depends from claim 1, recites that the first and second asymmetrically adjustable collimators each have a ***fixed collimation edge that defines the second outer x-ray projection and an adjustable collimation edge that defines the first outer x-ray projection***, and each of the adjustable collimation edges moves between a first position at which the first and second radiation is symmetrical about the rotational center and at least one other position at which the first and second radiation is asymmetrical about the rotational center.

As discussed above, Shinno et al. discloses collimators that have moveable shield plates and driving units that separately move the plates to adjust both of the outer x-ray projections to adjust the beam width and center position. In addition, Shinno et al. discloses moving the moveable shield plates to move both of the outer x-ray projections in opposite directions to define the beam width in accordance with a FOV or an ROI in the FOV, and moving the moveable shield plates to move both of the outer x-ray projections in the same direction to move the beam center with respect to the ROI. However, Shinno et al. is silent regarding a fixed shield plate, let alone a fixed shield plate that defines one of the outer x-ray projections of a radiation beam and an adjustable shield plate that defines the other one of the outer x-ray projections of the radiation beam in which the adjustable shield plate moves between positions to define either a symmetrical or an asymmetrical beam with respect to the rotational center.

Accordingly, Shinno et al. does not teach or suggest the above noted claimed aspect, and the rejection of claim 18 should be withdrawn.

Conclusion

In view of the foregoing, it is submitted that the pending claims distinguish patentably and non-obviously over the prior art of record. An early indication of allowability is earnestly solicited.

Respectfully submitted,

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